
NOTES AND NEW COMBINATIONS IN HAWAIIAN *PANICUM* (POACEAE: PANICEAE)

The genus *Panicum* (excluding *Dichanthelium* sensu Clark & Gould, 1978) is quite diverse in the Hawaiian Islands, with 11 native species (five perennial, six annual) recognized by me in the account of the genus for the *Manual of the Flowering Plants of Hawaii*. Hitchcock (1922) also recognized 11 species, but the circumscriptions in my account differ from those of Hitchcock for many of the species.

St. John (1987) published 20 new species and one new variety while my account was in press. This included two later homonyms: *P. furtivum* St. John, *Phytologia* 63: 369. 1987, non Swallen, *Contr. U.S. Natl. Herb.* 29: 421. 1950; and *P. simplex* St. John, *Phytologia* 63: 371. 1987, non Willd. ex Spreng., *Syst. Veg.* 1: 318. 1825, nec Rottl. ex Trin., *Gram. Panic.* 216. 1826. I have studied all but one (*P. sylvanum*) of the types of these names, and as a result, reduce all but one (*P. lineale*) to synonymy. The synonyms I attribute to *P. fauriei* are listed under the three varieties I recognize; all the others are treated in the *Manual*. Two of the varieties need new combinations. For *P. lineale*, a species I independently recognized as new, I provide an amplified description and other additional information.

PANICUM FAURIEI COMPLEX

This is a distinctive coastal species characterized by an annual habit; short stature; usually branching, puberulent culms; loosely involute blades, puberulent below and velutinous above; and small panicles with appressed, puberulent, or shortly pubescent branches. Before St. John's (1987) paper, this group had in recent years been recognized as five species. I believe that three varieties are recognizable primarily on the basis of spikelet differences as summarized in the following key:

- 1a. Spikelets 1.5–2.3 mm long, mostly acute, sometimes acuminate, glabrous var. *fauriei*
- 1b. Spikelets 1.8–4.2 mm long
 - 2a. Spikelets 2–4.2 mm long, acuminate to acute, shortly pubescent except for prominent tufts of hairs toward the tips of the glumes var. *latius*
 - 2b. Spikelets 1.8–2.3 mm long, acute, shortly pubescent var. *carteri*

***Panicum fauriei* A. Hitchc.**, Mem. Bernice Pauahi Bishop Mus. 8(3): 182, fig. 71. 1922. TYPE: U.S.A. Hawaii: [Molokai], Halawa, June 1909, *Faurie 1318* (holotype, US; isotype, BM).

The length of the glumes in plants with predominantly acuminate spikelets often varies from acuminate to shortly acuminate or acute within the same inflorescence; thus, plants assigned to var. *latius* are very variable in spikelet length. Plants that display the most strongly expressed characteristics of var. *latius* occur on Lanai and Oahu. On other islands (Kauai, Molokai, Maui, Kahoolawe, and Hawaii), as well as in other populations on Oahu and Lanai, the tufts of hairs tend to be shorter and the spikelets tend to be less acuminate and more often acute. Since stem, leaf, and inflorescence morphology are virtually identical in the complex, and since the shape of glumes is demonstrably variable within and among populations and individuals, the only reasonably useful character is glume pubescence, which ranges from absent to shortly pubescent, sometimes with increasingly prominent apical tufts of long hairs. I believe this variation is indicative of varieties.

Panicum fauriei var. *fauriei*

P. degeneri Potzal, Mitt. Bot. Gart. Mus. Berlin-Dahlem 1: 128, fig. 1. 1953. TYPE: U.S.A. Hawaii: Hawaii, N of Kaahola Light House, Hawi, in prostrate tufts on soil washed by ocean spray during storms, more resistant to salt than neighboring *Digitaria henryi*, 8 Feb. 1952, *Degener 21807* (holotype, B not seen; isotypes, K, MO, US).

P. moomomiense St. John, *Rhodora* 78: 543, fig. 1. 1976. TYPE: U.S.A. Hawaii: Molokai, Moomomi, limestone sand dune, 1 mi. SW of beach, 21 Jan. 1973, *Pekelo, Jr. 18* (holotype, BISH not seen).

P. sylvanum St. John, *Phytologia* 63: 372. 1987. TYPE: U.S.A. Hawaii: Maui, Maliko Bay, *Sylva s.n.* (BISH not seen).

The holotype of *P. degeneri* is described and illustrated as having a line of short hairs along the midnerve. Such hairs are not evident in all spikelets of the cited isotypes and when present are so sparse and small that the spikelets are essentially glabrous.

Although I have not seen the holotype of *P.*

moomomiense, I have studied the two paratypes (Pekelo 8, 303, both BISH) and one topotype (Herbst & Pekelo 2948, BISH). They represent plants with spikelets 1.8–2 mm long, which is in the lower size range for the variety, but they are in no way significantly different from the variation pattern of the variety.

I also have not seen the type of *P. sylvanum*, but the illustration and description leave no doubt that this specimen belongs to var. *fauriei* because of its glabrous spikelets 1.7–2 mm long.

Panicum fauriei* var. *latius (St. John) Davidse, stat. nov. *P. nubigenum* Kunth var. *latius* St. John, Phytologia 47: 376. 1981. TYPE: U.S.A. Hawaii: Kahoolawe Island, on sea cliff of rocky coast W of Waikahalulu Bay, E of Hanakanaea Cove (Smuggler's Cove), ca. 100 ft., 21 Apr. 1980, Cuddihy & Char 349 (holotype, BISH).

P. nubigenum sensu Hitchcock (1922), non Kunth (1833). *P. ninoleense* St. John, Phytologia 63: 371. 1987. TYPE: U.S.A. Hawaii: Ninole Island, Wailua Ninole, Kan Dist., in gravel on top of basalt point, 30 ft., 25 Dec. 1949, St. John, Hatheway & Morton 23954 (holotype, BISH).

The name *P. nubigenum* Kunth was misapplied by Hitchcock (1922) to *P. fauriei* var. *latius*. Kunth's name was a nomen novum for *P. montanum* Gaud., non Roxb. However, the type of *P. montanum* Gaud. [Insulis sandwicensibus, 1829, Gaudichaud s.n. (holotype, P not seen, fragment, US; isotype, K)] actually is a depauperate specimen of *P. torridum* Gaud. This is evident from the flat rather than loosely involute blades, spikelets with hairs mostly 2–2.5 mm long, borne mainly from just below the middle of the glumes to the beginning of their acuminate tips (rather than primarily at the tip), and more pilose branches.

Mature spikelets of the holotype of *P. ninoleense* are 2–2.6 mm (not 1.5–2 mm as in the description) and have the pubescence pattern of var. *latius*.

Panicum fauriei* var. *carteri (Hosaka) Davidse, comb. et stat. nov. *P. carteri* Hosaka, Occas. Pap. Bernice Pauahi Bishop Mus. 17: 67, fig. 1. 1942. TYPE: U.S.A. Hawaii: Oahu, Mokolii Islet, off coast of Oahu, rocky ledge on north end of islet, rare, 10 ft., 6 Nov. 1941, Hosaka & Maneki 2611 (holotype, BISH not seen; isotypes, K, US).

P. annuale St. John, Phytologia 63: 368. 1987. TYPE: U.S.A. Hawaii: West Maui, Wailuku Dist., Kahaku-

loa, mouth of Makamukaole Stream, right side, coastal vegetation, 15 ft., 7 July 1978, Sylva & Clarke s.n. (holotype, BISH).

P. kukaiwaaense St. John, Phytologia 63: 370. 1987. TYPE: U.S.A. Hawaii: East Molokai, N coast, Kukaiwaa in bare dirt just above sea cliff, 29 Aug. 1984, Hobdy 2184 (holotype, BISH).

P. malikoense St. John, Phytologia 63: 371. 1987. TYPE: U.S.A. Hawaii: Maui, ½ Haiku of Maliko Gulch, sea headland, 50–150 ft., open vegetation, 19 Dec. 1976, Sylva s.n. (holotype, BISH).

The types of *P. annuale*, *P. kukaiwaaense*, and *P. malikoense* are very similar, but they differ slightly in spikelet size. The lower glume is very sparsely pubescent in all three specimens, which is the reason they are assigned to var. *carteri*.

One of the practical effects of this reclassification of *P. fauriei* is that the legal status of *P. carteri* may require reevaluation since it has been legally declared as endangered (Cook, 1981; Arnett, 1983). I interpret the Mokolii Island population, *P. carteri*, sensu stricto, to represent one of several populations of var. *carteri* spread over at least two other islands (Maui, Hawaii).

Panicum lineale St. John, Phytologia 63: 370. 1987. TYPE: U.S.A. Hawaii: Kauai, ridge 1,300 ft. S of Kulanaililia, 1,400 ft., steep ledges in openings in moderately wet forest, bunchgrass 1½ ft. tall, 4 Mar. 1978, Christensen 324 (BISH).

Densely caespitose perennial bunchgrass, 55–126 cm tall; culms erect, unbranched, glabrous. Leaves primarily basal, often strongly distichous; sheaths glabrous or puberulent toward the apex; ligule a rudimentary membrane with cilia 0.4–0.6 mm long; collar densely velvety puberulent, especially on the sides; blades 59–85 cm long, 4–9 mm wide when unrolled but mostly involute, glabrous below, densely velvety pubescent above at the base behind the ligule and the lower portion, otherwise glabrous, the tip long-acuminate. Panicles 20–35 cm long, 6–10 cm wide; rachis glabrous; branches spreading at acute angles, very sparsely scaberulous, the pulvini pubescent. Spikelets 3.8–4.8 mm long, linear-lanceolate, acuminate, glabrous; rachillar internodes prominent; glumes unequal, the lower 1.7–2.6 mm long, 3–7-nerved, acute, the upper 3.4–4.5 mm long, 9-nerved, acuminate; lower floret sterile; lower lemma as long as the spikelet, similar to the upper glume, 7–9-nerved; lower palea ⅓–½ as long as the lower lemma, narrow, acuminate; upper floret 2.5–2.9 mm long, 0.7–0.8 mm wide, linear-elliptic, cartilaginous, smooth, shiny, acute, the lemma and palea equal in length; anthers 3, 1.7–2.4 mm

long, orange; styles 2, separate; stigmas plumose, purple; caryopsis 1.6–1.7 mm long, 0.7 mm wide, oblong-elliptic, the embryo 0.8 mm long, the hilum 0.4–0.5 mm long, basal, elliptic.

Additional specimens examined. U.S.A. HAWAII: Kauai, Kalahu, W rim of Kalalau Valley, precipitous slope at 3,000 ft., single specimen seen, 1 Feb. 1950, *Degener & Hatheway 20444* (US); Kauai, Na Pali Coast, between Waiahuakua and Hoolulu Valley, ca. 600 ft., large bunchgrass growing beside trail with *Eragrostis variabilis*, 10 Apr. 1980, *Corn ESP 190* (BISH); Kauai, along a steep, wet ridge running up the W slope of Wainiha Valley to SW of Kulanaililia, forest of *Metrosideros*, *Eugenia*, etc., bunchgrass, anthers conspicuously orange, quite common, 400 m, 20 Mar. 1976, *Fay, Moriarity & Robinson 588* (BISH, K, MO, PRE, SI, US).

Panicum lineale is so far known only from the moist, northwestern windward side of Kauai. Although it is a prominent grass, it must be very localized, judging from the paucity of collections. J.J. Fay (pers. comm.) collected this species at the margin of a pasture. Fay also noted that clumps of this grass pulled out of the ground readily, and this may indicate that it does not persist long in secondary areas that are subject to grazing.

This species is amply distinct from all other native *Panicum* (s. str.) species by its short lower glume and long, narrow spikelets. All others have a lower glume as long as or slightly shorter than the spikelet.

Although this species probably belongs to subg. *Panicum* sect. *Panicum* (sensu Hsu, 1965), a good understanding of its precise relationships eludes

me. Anatomical studies of its leaves, lemmas, and lodicules would probably make such a determination easier.

Specimens of the *Fay et al.* 588 collection have been distributed with the unpublished name *P. napaliensis*.

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